VIDEO GAME SYSTEM WITH DATA TRANSMITTING/RECEIVING CONTROLLER

FIELD OF THE INVENTION

[0001] This invention relates to a game machine system having an operating device or game controller. More particularly, this invention relates to a game machine system including a game machine, such as a personal computer or a video game apparatus, and an operating device (controller) for transmitting and receiving data to and from the game machine.

BACKGROUND OF THE INVENTION

[0002] **FIG. 1** is a block diagram of a conventional electronic game machine **80** and a controller. In the figure CPU **81** (Central Processor Unit) writes data into a W-RAM **83**, reads data out of the W-RAM **83** and transmits data to a PPU **84** (Picture Processing Unit), in synchronism with a clock signal and according to program data stored in a ROM **82** (Read Only Memory). The game machine generates a picture image signal which is output by PPU **84** based on image data in V-RAM **85**. The CPU **81** also transmits a clock signal to a controller **90**A or **90**B to directly receive data in synchronism with the clock signal based upon switch actuation by an operator. The CPU **81** outputs data to PPU **84** so as to change the image signal in accordance with the data input from controller **90**A or **90**B.

[0003] The game machine **80** and controllers **90**A and **90**B are connected by a data line for receiving operating device data from the controllers **90**A and **90**B and a clock signal line for transmitting a clock signal to the controllers **90**A and **90**B for synchronizing timing of data transmission from the controller and timing of operation of the CPU **81**. The data line is connected directly to the CPU **81** via an interface (not shown). In other words, in the conventional game machine system, data from controllers **90**A and **90**B is read directly by the CPU **81** which performs image processing at timing based on the clock signal. CPU **81** has to directly read the signals from controllers **90**A and **90**B, thus increasing the amount of processing by CPU **81**. Furthermore, CPU **81** has to read the signal from the controller in synchronism with the clock, so that there needs to be a clock line, in addition to the data line for transmission and reception of data. To this end, there is increase in the number of pins of the connector for connecting between the controller cable and the game machine, raising manufacturing costs. Furthermore, the conventional controllers **90**A and **90**B each include a plurality of switches and transmission of data to the main-body game machine occurs depending upon whether or not an individual switch is depressed.

[0004] As the amount of controller data increases, the amount of time required for the CPU to read controller data also increases. Thus, the CPU has an increases processing burden as the amount of such data increases.

[0005] Moreover, conventionally, a clock signal line is required in addition to the data line for connection between a controller and the game machine. Thus, the number of pins of the connector connecting the controller and the game machine is increased, adding to manufacturing costs.

[0006] In addition, conventional controllers do not typically permit transmission and reception of data without regard to whether or not an individual switch is depressed. In conventional video game systems, it has been impossible to flexibly utilize a controller in a variety of methods of use by extending its use in various ways after purchasing.

SUMMARY OF THE INVENTION

[0007] It is therefore an object of a first invention to provide a game machine which is capable of reducing the amount of CPU processing to secure more time for image processing by the CPU.

[0008] It is an object of a second invention to provide a game machine system which is capable of reducing the amount of CPU processing time to secure more time for image processing in the CPU, and to reduce manufacturing costs by reducing the number of connector pins for connecting a controller and the game machine. Also, it is an object to provide a game machine system in which the controller uses may be extended in various ways.

[0009] In a first illustrative embodiment, a game machine is connected to a plurality of operation controlling or operating devices adapted to be operated by an operator and to output, by modulation, output device data representative of an operating state of the operating device in response to received command data. The game machine performs image processing based on the operating device data, and includes: a central processing means, an operation storing means, a receiving means, a temporary storing means, a further data processing means, and transmitting means.

[0010] The central processing means operates to perform image processing operations based on a predetermined stored program. The operation storing means is accessed by the central processing means and stores data required for advancing a game by the central processing means including data from the operating device. The receiving means receives, by demodulation, the operating device data from the operating device. The temporary storing means temporarily stores the operating device data. The further data processing means carries out predetermined data processing operations according to a command by the central processing means. The transmitting means transmits, by modulation, data output from the further data processing means to the operating device. The central processing means outputs command data for reading out the operating device data. The data processing means outputs the command data from the central processing means to the transmitting means, so that the operating device data received by the receiving means is stored in the temporary storing means to be transferred to the operation storing means.

[0011] The game machine system may be connected to a plurality of operating devices to be operated by an operator and a video game processing system carries out image processing based on operating device data from the operating devices. The game machine, includes: a central processing means, an operation storing means, a first receiving means, a temporary storing means, a first data processing means, a first transmitting means, and a connecting means; and the operating device includes: a second receiving means, a wide variety of operation controlling mechanisms including various switches, a second data processing means, and transmitting means.

[0012] According to the game machine of an illustrative embodiment of the present invention, the central processing